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Attorney Docket No.: 06011/30226

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: David L. Fosnaugh	)
APPLICATION NO.: 07/699,479	) Examiner: S. Choi
FILED: May 13, 1991	) Art Unit: 3724
FOR: DIE-SHAPING APPARATUS AND PROCESS AND PRODUCT FORMED THEREBY	)

AFFIDAVIT OF DAVID L. FOSNAUGH UNDER 37 C.F.R. §1.132

I, David L. Fosnaugh, hereby swear as follows:

1. I am the inventor of the subject matter described and claimed in United States Patent Application Serial No. 07/699,479, entitled "DIE-SHAPING APPARATUS AND PROCESS AND PRODUCT FORMED THEREBY."

2. I have reviewed the Office Action mailed April 7, 2004, and Wesstrom et al., U.S. Patent No. 3,388,582 (Wesstrom), the primary prior art reference on which the rejections of the claims are based.

3. The purpose of this Affidavit is to submit evidence of secondary considerations of non-obviousness, and particularly a solution to a long felt need in the industry, in order to further rebut the obviousness rejections based on the Wesstrom reference.

4. I have been in the employ of Franklin Electric Co., Inc. of Bluffton, Indiana (Franklin Electric) since 1984, excluding a period between May and August, 1999. I have become expert in the areas of motor lamination die-shaping apparatus and methods, and particularly those relating to forming motor lamination rotor and stator discs for use in manufacturing electric motors.

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5. Franklin Electric began producing stators and rotors for electric motors in the mid-1970's utilizing progressive die procedures. Essentially, the same process was used until my invention was implemented about two years prior to filing this continuation-in-part patent application. That process involved cutting a large roll of steel into zigzag or scroll slit coils. The scroll slit strips were run through a progressive die to produce individual motor lamination rotor and stator discs. The zigzag scroll configuration was introduced in favor of a conventional straight slit configuration in order to achieve a 15% greater utilization of the surface area of the initial large steel roll.

6. In 1984, I began working to improve the known processes, and in 1986, to specifically address problems created by progression error resulting from using the scroll slit material configuration. Progression error through the die created problems such as bowed discs, lack of inside diameter (ID) to outside diameter (OD) concentricity or run out, and substantial underutilization of the initial steel roll. Secondary operations were used to try to bring discs back within flatness and run out tolerances. Parts that could not be fixed were scrapped. Franklin Electric only gained a modest 6 to 7% material savings or scrap reduction using the zigzag configuration, instead of the full, expected 15%.

7. As far as I am aware, competitors of Franklin Electric used the same process to form motor lamination discs and had been doing so before 1970. These competitors experienced, for at least two decades, the same manufacturing problems facing Franklin Electric. During that time, the primary competitors of Franklin Electric included General Electric and Emerson.

8. I worked for four or five years at Franklin Electric specifically trying to solve the above noted problems before coming up with my invention. No other competitor solved these problems, even though they had been experiencing these same problems for a longer period of time than Franklin Electric. After much effort and development, I invented, and Franklin Electric employed scroll relief in the zigzag or scroll strips. This invention addressed a long felt need in the electric motor industry and solved significant problems that had faced the industry for at least two decades.

9. Upon implementing my invention, Franklin Electric was able to realize the full 15% material savings, was able to essentially eliminate progression error through the progressive die, which resulted in about a 40% improvement in process efficiency, and achieved a nearly 80% improvement in lamination disc quality (i.e., improved flatness and run out).

10. L. H. Carbide produced and sold dies to General Electric and to Emerson for manufacturing motor lamination rotor and stator discs. To the best of my knowledge, L.H. Carbide still supplies dies to each of these competitors of Franklin Electric.

11. Almost immediately upon learning of my invention, L.H. Carbide modified its dies to incorporate my invention and sold such dies to both General Electric (see EXHIBIT A) and to Emerson (see EXHIBIT B). Such immediate actions provide convincing evidence of the existence of a long felt need in the industry. Franklin Electric's competitors immediately adopted the same solution employed by Franklin Electric to solve the same problems.

12. Both General Electric and Emerson have been successful in producing motor lamination discs using my invention. To the best of my knowledge, both General Electric and Emerson employ scroll relief to this day in producing motor lamination rotor and stator discs.

13. It is my observation that the success of my invention lies entirely on the claimed features of the current disclosure. The narrow bridges of my invention can both lengthen and shorten as needed at each die station of a progressive die while running scroll steel through the dies. The lengthening and shortening of these bridges overcomes the tolerance variations between adjacent discs in the strip of steel, and thus eliminates progression error in the process. The adoption of my invention by General Electric, Emerson, and L. H. Carbide is directly connected to the claimed features of my invention.

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This connection must be made because these claimed features are solely responsible for eliminating the problems that had been dealt with for two decades by those in the industry.

14. This evidence of long felt need in the industry for my invention, and immediate success upon adoption of the invention, provides evidence of secondary considerations as additional proof that my invention is not obvious in view of Wesstrom.

15. I hereby affirm that all of the foregoing statements are true and accurate to the best of my knowledge and belief, that each of the documents appended hereto (if any) are true and accurate copies of what they purport to represent, and that I am aware that any false statements may subject me to penalties for perjury and may jeopardize the validity of any patents that may issue on the present application.

September 21, 2004

David L. Fosnaugh
Inventor

Attorney Docket No.: 06011/30226

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2. I have reviewed the Office Action mailed April 7, 2004, and Wesstrom et al., U.S. Patent No. 3,388,582 (Wesstrom), the primary prior art reference on which the rejections of the claims are based.

3. The purpose of this Affidavit is to submit evidence of secondary considerations of non-obviousness, and particularly the unexpected results achieved by the invention, in order to further rebut the obviousness rejections based on the Wesstrom reference.

4. I have been in the employ of Franklin Electric Co., Inc. of Bluffton, Indiana (Franklin Electric) since 1984, excluding a brief period between May and August, 1999. I have become expert in the areas of motor lamination die-shaping apparatus and methods, and particularly those relating to forming motor lamination rotor and stator discs for use in manufacturing electric motors.

5. Well prior to my invention, it was common to longitudinally cut a roll of steel into multiple straight slits, producing linear strips of metal from which the motor lamination discs would be die cut. Progression error did not occur using straight slit coils because no feature of a lamination disc would be formed in the strip until being loaded and run through the progressive die. The center-to-center distance between adjacent discs would be set by die formations and not by any feature of the straight slit strip.

6. Also well prior to my invention, Franklin Electric began making metal motor lamination rotor and stator discs, sometime in the mid-1970's. From initial start up, Franklin Electric cut the initial strips of material from a roll of steel in a zigzag or scroll configuration. In the zigzag configuration, every other strip is offset longitudinally from its adjacent strips. In comparison to the straight slit configuration, the zigzag or scroll arrangement results in about 15% less scrap material from the initial steel roll. Thus, it was believed at that time that Franklin Electric could expect to achieve the entire 15% material savings or scrap reduction by employing the scroll configuration instead of the straight slit configuration.

7. Implementation of the zigzag scroll configuration created variation between adjacent disc centers along any given steel scroll. The center-to-center variation is present in the scroll prior to being loaded and run through a progressive die. During progressive die runs, the center-to-center variation along the scroll or strip resulted in progression error, as described in this patent application, as a strip is run through a progressive die during formation of the discs.

8. By opting to use the zigzag or scroll configuration, Franklin Electric achieved only a modest 6 to 7% material savings, instead of the expected 15% savings, as a result of progression error. The lost material savings opportunity of 8 to 9% was caused by misalignment between die stations and lamination disc sections of the steel scroll, which resulted in poor die alignment at various die stations along the progressive die. The lost material savings opportunity resulted from the misaligned die cut discs having to be scrapped.

9. Additionally, progression error or misalignment caused other problems. As a scroll was being run through the die, misalignment eventually would occur between a die center and a disc center in either longitudinal direction along the die. If the misalignment was beyond tolerance, the progressive die would shut down. Shut down alone significantly reduces line efficiency. Also, if the misalignment was caused by the strip center-to-center distance being shorter than the die center-to-center distance, the scroll or strip would be scrapped because it could not be realigned within the machine. If the misalignment was caused by the strip center-to-center distance being longer than the die center-to-center distance, one could override the detection apparatus or switches. However, substantial bowing would occur in the discs created by compression stress along the strip. The dies and presses would often have to be reset and/or reloaded, and then restarted. We estimated at the time that a given progressive die was running at only 50 to 60% capacity or efficiency as a result of the frequency of shut down, the excessive scrap material scrap, and the time necessary to get the die back up and running.

10. Upon implementing my invention, Franklin Electric was able to achieve the 15% material savings or scrap reduction expected as a result of using the zigzag or scroll strip configuration. The narrow deformable bridges between each disc in a coil lengthen or shorten at any given die station along the progressive die to correct for progression error in either longitudinal direction to enable proper alignment between the die station centers and the disc centers all along the progressive die.

11. Also upon implementing my invention, another rather unexpected result was achieved. The progressive dies immediately could be run at nearly full capacity, i.e. significantly better than 95% efficiency. Though we expected improvement in die efficiency, we did not expect such a substantial, drastic improvement.

12. Importantly and completely unexpectedly, implementation of my invention also produced another very significant result. Finished rotor and stator disc quality unexpectedly improved substantially. Among other things, a finished rotor or stator lamination disc is typically measured for flatness and for inside diameter (ID) to outside diameter (OD) concentricity or run out. Essentially, the measurements would determine the

degree of bow or flatness and the degree of offset or "out of center" for a finished rotor or stator disc.

13. Prior to implementing my invention, virtually all of the rotor and stator discs had a significant bow and had significant run out. Individual discs regularly had to be reworked during secondary operations, after disc fabrication, to bring flatness and/or ID to OD concentricity back within tolerance. Parts that could not be sufficiently reworked would be scrapped. Reworking rotor and stator discs was time consuming, resulted in significant added labor cost, and seriously reduced manufacturing efficiency. Scrapping discs also directly affected cost and efficiency.

14. Progression error during a progressive die run using the zigzag or scroll configuration caused undue stress on the steel strip as the discs were being cut. These stresses in the strip created the bow and run out.

15. Upon implementation of my invention, overall product quality of the finished lamination discs improved unexpectedly and greatly. Franklin Electric unexpectedly achieved about 80% improvement in both flatness and run out for finished motor lamination discs using my invention. Discs produced using my invention are, within acceptable tolerance ranges, virtually flat and have very little, if any, run out. Secondary operations to rework finished lamination discs have been virtually unnecessary since my invention was implemented.

16. Unexpectedly, incorporating my invention has nearly eliminated progression error and also the tensile and compression stresses created along the scrolls by progression error, both of which have resulted in a number of additional unexpected benefits. Most dies and presses are now run without shutdowns. An entire new coil can be run through the dies and presses, completely to the end, without the progressive die apparatus having to be shut down even once. The material savings expected of the zigzag scroll configuration have been realized. Product quality has improved by about 80%.

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17. It is my observation that the success of my invention lies entirely on the claimed features of the current disclosure. The narrow bridges of my invention can either lengthen and shorten, as needed, at each die station of a progressive die while running scroll steel through the dies. The lengthening and shortening of these bridges corrects for the progression error, i.e., center-to-center distance variations in either longitudinal direction between adjacent discs in the strip of steel, and thus eliminates progression error in the process. The unexpected results achieved by my invention are directly connected to the claimed features of my invention. This connection must be made because these claimed features are believed by me to be solely responsible for eliminating the problems noted above in the prior art methods and die constructions.

18. The unexpected results achieved upon implementation of my invention provide evidence of secondary considerations as additional proof that my invention is not obvious in view of Wesstrom.

19. I hereby affirm that all of the foregoing statements are true and accurate to the best of my knowledge and belief, and that I am aware that any false statements may subject me to penalties for perjury and may jeopardize the validity of any patent or patents that may issue on the present application.

September 21, 2004

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2. I have reviewed the Office Action mailed April 7, 2004, and Wesstrom et al., U.S. Patent No. 3,388,582 (Wesstrom), the primary prior art reference on which the rejections of the claims are based.

3. The purpose of this Affidavit is to submit evidence of secondary considerations of non-obviousness, and particularly that others have copied and implemented my invention, in order to further rebut the obviousness rejections based on the Wesstrom reference.

4. I have been in the employ of Franklin Electric Co., Inc. of Bluffton, Indiana (Franklin Electric) since 1984, excluding a brief period between May and August, 1999. I have become expert in the areas of motor lamination die-shaping apparatus and methods, and particularly those relating to forming motor lamination rotor and stator discs for use in manufacturing electric motors.

5. Franklin Electric began producing stators and rotors for electric motors utilizing progressive die procedures sometime during the mid-1970's. Essentially the same process was used until about 1989. That process involved longitudinally cutting a large roll of steel into zigzag or scroll strips or coils. The scroll or zigzag slit coils were run through a progressive die to produce individual motor lamination rotor and stator discs.

6. In 1984, I began working to improve the known processes. Problems with that old process included progression error through the die, bowed discs, lack of inside diameter (ID) to outside diameter (OD) concentricity or run out, and substantial underutilization of the initial steel roll. Post fabrication, secondary operations were used to rework discs to bring them back within flatness and run out tolerances. Parts that could not be fixed were scrapped.

7. As far as I am aware, competitors of Franklin Electric employed essentially the same process and experienced these same manufacturing problems. At that time, the primary competitors of Franklin Electric included General Electric and Emerson. L.H. Carbide manufactured dies and sold dies to both General Electric and Emerson at that time. L.H. Carbide was one of the die suppliers to Franklin Electric at that time and supplied a proportion of the dies used by Franklin Electric.

8. Franklin Electric implemented my invention around the time of filing this patent application. Specifically, the scroll relief method described in this patent application was employed to alleviate problems in using the zigzag or scroll strip configuration.

9. Running the zigzag scrolls through the progressive dies amplified a number of existing problems (see Paragraph 6 above) known for the progressive die method of fabricating motor lamination discs. Franklin Electric also did not achieve the full and expected material savings opportunity of 15% by implementing the zigzag scroll configuration, but instead achieved only a modest 6 to 7% material savings.

10. Upon implementing my invention, Franklin Electric was able to realize the full 15% material savings, was able to essentially eliminate progression error through the progressive die, which resulted in about a 40% improvement in process efficiency, and achieved an unexpected, nearly 80% improvement in lamination disc quality (i.e., improved flatness and run out).

11. As stated before, L. H. Carbide produced and sold dies at that time to both General Electric and Emerson for manufacturing motor lamination rotor and stator discs. To the best of my knowledge, L.H. Carbide still supplies dies to each of these competitors. L.H. Carbide no longer supplies any dies or die services to Franklin Electric.

12. In late 1989 or early 1990, L.H. Carbide made and sold dies to General Electric for use with zigzag scroll or coil configurations in an interlocking die, tandem die set up, but without implementing my invention. General Electric could not run the machine because these dies would not function properly. An interlocking die arrangement requires very close tolerances in the strip center-to-center distances.

13. General Electric returned these dies to L.H. Carbide to be reworked. L.H. Carbide modified the dies to incorporate my invention, scroll relief, in late 1990 and returned the reworked dies to General Electric. Upon utilizing the reworked dies, General Electric was immediately successful in manufacturing motor lamination discs and interlocked rotor cores using zigzag or scroll material, as a direct result of implementing my invention. See the attached EXHIBIT A, which is an internal L.H. Carbide memorandum produced during the interference proceedings relating to this patent application. EXHIBIT A provides evidence of direct copying of my invention by L.H. Carbide and General Electric.

14. L.H. Carbide has also sold dies to Emerson that employ my invention. These dies have been very successful for Emerson in producing motor lamination rotors and stators. See the attached EXHIBIT B, which is an internal L.H. Carbide memorandum produced during the interference proceedings relating to this patent application. EXHIBIT B provides evidence of direct copying of my invention by L.H. Carbide and Emerson.

15. It is my observation that the success of my invention lies entirely on the claimed features of the current disclosure. The narrow bridges of my invention can both lengthen and shorten at each die station of a progressive die to correct for progression error in either longitudinal direction while running scroll steel through the dies. The lengthening and shortening of these bridges corrects for progression error, i.e., variation in the center-to-center distances between adjacent discs in the strip of steel, and thus eliminates progression error in the process.

16. The direct copying by General Electric, Emerson, and L. H. Carbide is directly connected to the claimed features of my invention. This connection must be made because these claimed features are believed by me to be solely responsible for eliminating the problems noted above in the prior art methods and die constructions.

17. This evidence of copying by others of my invention, and their immediate success upon copying my invention, provides evidence of secondary considerations as additional proof that my invention is not obvious in view of Wesstrom.

18. I hereby affirm that all of the foregoing statements are true and accurate to the best of my knowledge and belief, that the documents appended hereto are true and accurate copies of what they purport to represent, and that I am aware that any false statements may subject me to penalties for perjury and may jeopardize the validity of any patents that may issue on the present application.

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